Boundary Recommendations for the 8-Hour Ozone Standard in South Carolina

Introduction

Section I. 2003 Area Designation Recommendations

In response to the United States Environmental Protection Agency's (EPA) letter of March 19, 2003, requesting updated recommendations for 8-hour ozone National Ambient Air Quality Standard (air quality standard) designations and in accordance with the requirements of Section 107(d) of the Clean Air Act (CAA), the South Carolina Department of Health and Environmental Control (Department), as designee of the Governor of the State of South Carolina, submits the following recommendations. This submittal is made on the basis of air quality data, planning and control considerations, and other air quality-related concerns. These recommendations also take into consideration comments received at the public meeting, via the web page developed for this purpose, and in various other forums.

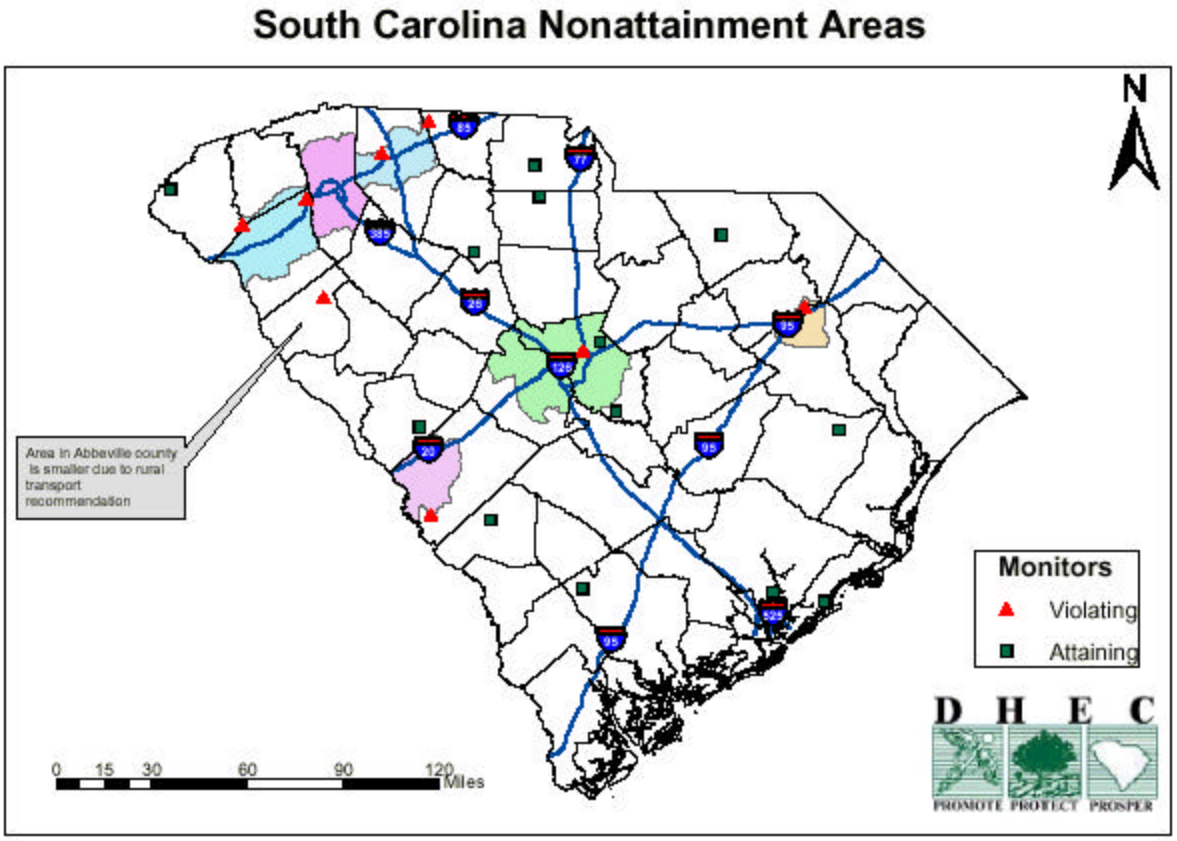
Table 1
South Carolina Recommended Area Designations
Ozone (8-hr Standard)

Area, or portion thereof	Designation Type	Classification Type*
Due West Monitoring Site	Nonattainment	
Aiken	Nonattainment	
Anderson	Nonattainment	
Columbia	Nonattainment	
Florence	Nonattainment	
Greenville	Nonattainment	
Spartanburg	Nonattainment	
Remainder of State	Attainment / Unclassifiable	

** Classification type cannot be determined because the federal 8-hour ozone implementation rule has not been finalized. The Department respectfully requests that EPA not finalize designations until the implementation rule has been finalized. States should be provided the opportunity to fully understand what implementation of the 8-hour ozone standard means to a given area and to update these recommendations accordingly.*

Additional data to support the recommendations found in Table 1 are provided in the documents evaluating each recommended nonattainment area boundary. The criteria and data provided to justify the Department's recommendations are specific to each individual area and are consistent with the guidance provided by EPA. Further, the supplementary information provided for each area substantiates how these recommendations are consistent with the definition of nonattainment in section 107(d)(1) of the CAA and why these recommended nonattainment areas are appropriate. These separate and distinct boundaries will promote greater efficiency in the administration of control strategies and facilitate implementation of the various State plans developed to ensure attainment and maintenance of the air quality standards. If additional control measures are required to attain the 8-hour ozone standard, the Department has the statutory authority under S. C. Code sections 48-1-20 and 48-1-50(23) to promulgate and implement regulations and to require more stringent controls on industrial and mobile sources to realize appropriate

emissions reductions outside of any nonattainment area.



These separate and distinct boundaries will encompass the urbanized portions of four of the eight SC Metropolitan Statistical Areas (MSA) (based upon 1990 Census) and portions of eleven counties and will allow the State better coordination of emissions controls within the jurisdictional boundaries of the various areas. Further, section 182(h) of the CAA states that EPA may treat an ozone nonattainment area as a rural transport area if EPA finds that sources of volatile organic compounds (VOC) and oxides of nitrogen (NO_x) emissions within the area do not make a significant contribution to the ozone concentrations measured in the area or in other areas. Detailed discussion concerning rural transport will follow in the Due West nonattainment boundary section.

Section II. Background and General Requirements

On April 30, 1971, EPA promulgated air quality standards for photochemical oxidants under section 109 of the CAA (36 FR 8186). Identical primary and secondary air quality standards were set at an hourly average of 0.08 parts per million (ppm) total photochemical oxidants not to be exceeded more than one hour per year. By law, EPA is required to review pollutant criteria every five years, so as to integrate new health developments into the regulatory process. A reevaluation of the human health studies prompted EPA into altering the photochemical oxidants air quality standard and establishing identical primary and secondary ozone (O_3) air quality standard of 0.12 ppm in 1979 (43 FR 16962). The 1979 air quality standard defined attainment of the standards as occurring when the expected number of days per calendar year with maximum hourly average concentrations greater than 0.12 ppm is equal to or less than one. A violation of this standard would occur if there were four or more exceedances of the standard in a three-

year period. On July 18, 1997 (62 FR 38856), based on its review of the available scientific evidence linking exposures to ambient ozone to adverse health and welfare effects at levels allowed by the 1-hour standard, EPA again promulgated revisions to the air quality standard for ozone. EPA revised the standards to establish the more stringent 8-hour standard at a level of 0.08 ppm based on the 3-year average of the annual fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area. The 1-hour secondary standard was also replaced by an 8-hour secondary standard identical to the new primary standard.

Promulgation of these new ozone standards in 1997 triggered the requirement under section 107 of the CAA and section 6103 of the Transportation Equity Act for the 21st Century (TEA-21) for EPA to designate areas as attainment/unclassifiable or nonattainment for the revised air quality standard. The process for designations provides each state an opportunity to recommend area designations including appropriate boundaries to EPA. The Department is taking this opportunity to submit to EPA this updated list of all areas (or portions thereof) in the State, designating as:

1. Nonattainment, any area that does not meet (or contributes to ambient air quality in a nearby area that does not meet) the national primary or secondary ambient air quality standard for the pollutant.
2. Attainment, any area (other than an area identified in clause (1) that meets the national primary or secondary ambient air quality standard for the pollutant, or
3. Unclassifiable, any area that cannot be classified on the basis of available information as meeting or not meeting the national primary or secondary ambient air quality standard.

On July 14, 2000, the Governor of South Carolina, through the Department, in accordance with the requirements of section 107 of the CAA and as requested by EPA, submitted initial boundary recommendations for the 8-hour ozone standard based upon 1997 through 1999 monitored ozone data. The Department recommended that the jurisdictional boundaries of seven Metropolitan Planning Organizations (MPO) be designated nonattainment areas. Upon receipt of the Department's recommendations, EPA proposed modifications, recommending that whole counties be designated nonattainment, and requested more information and further documentation to adequately support the Department's partial county recommendations.

On November 14, 2002, EPA requested that the Department submit updated, revised, or new designation recommendations and supporting documentation based on the 2000 through 2002 quality assured air monitoring data. The November 14, 2002, memorandum was revised on February 27, 2003, (transmitted to the states on March 19, 2003) extending the deadline for submittal of the boundary recommendations from April 15, 2003, to July 15, 2003. This submittal fulfills the request for boundary recommendations by July 15, 2003.

Section 107 of the CAA allows the Governor, in consultation with State and local air pollution control agencies, to undertake a study to evaluate monitoring data and recommend nonattainment area boundaries. Whenever a Governor finds and demonstrates to the satisfaction of EPA, and EPA concurs in such finding, that with respect to a portion of EPA's recommended modifications, in this case entire counties, that sources in the portion do not contribute significantly to violation of the national ambient air quality standard, EPA shall approve the Governor's request to exclude such portion from the nonattainment area. In making such finding, the Governor and EPA shall consider how each of the following factors affect the drawing of nonattainment area boundaries and how the resulting recommendation is consistent with the definition of nonattainment in section 107(d)(1) of the CAA:

A. Emissions and air quality in adjacent areas (including adjacent Consolidated MSA or MSA)
B. Population density and degree of urbanization including commercial development (significant difference from surrounding areas)

C. Monitoring data representing ozone concentrations in local areas and larger areas (urban or regional scale)
D. Location of emission sources (emission sources and nearby receptors should generally be included in the same nonattainment area)
E. Traffic and commuting patterns
F. Expected growth (including extent, pattern and rate of growth)
G. Meteorology (weather/transport patterns)
H. Geography/topography (mountain ranges or other air basin boundaries)
I. Jurisdictional boundaries (e.g., counties, air districts, existing 1-hour nonattainment areas, Reservations, etc.)
J. Level of control of emission sources
K. Regional emission reductions (e.g., NO_x SIP Call or other enforceable regional strategies)

In accordance with EPA's March 28, 2000, *Boundary Guidance on Air Quality Designations for the 8-Hour Ozone National Ambient Air Quality Standards*, the Department will address each of the seven recommended nonattainment area boundaries in separate documents and demonstrate how the resulting recommendations are consistent with the definition of nonattainment in section 107(d)(1) of the CAA. Each nonattainment area boundary recommendation will be divided into Sections A through K, in correlation with the eleven factors listed above, and will address how these factors affect the drawing of nonattainment area boundaries. Sections G, H, I, J, and K contain factors common to all areas, they are included in Section V of this Introduction.

Section III. State of South Carolina 2000 - 2002 Design Values

Table 2 lists all of the ambient ozone monitoring sites located in South Carolina and their 2000 through 2002 annual fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor and reported in parts per million (ppm). For the primary and secondary ozone standards, the 3-year average annual fourth-highest daily maximum 8-hour concentration is also the design value for the site. The third decimal place of the computed value is rounded, with values equal to or greater than 5 rounding up. Thus, a computed 3-year average ozone concentration of 0.085 ppm is the smallest value that is greater than 0.08 ppm. These calculated design values were utilized in formulating the Department's current designation recommendations. The location, scale, and objective of each monitoring site will be discussed in more detail in each of the Department's recommended area designations and associated nonattainment area boundaries.

Table 2
State of South Carolina 2000 - 2002 Design Values

County	Site ID	Site Name	4th Maximum 8-Hr. (ppm)			Design Value (ppm)
			2000	2001	2002	
Abbeville	45-001-0001	Due West	0.085	0.082	0.088	**0.085**
Aiken	45-003-0003	Jackson Middle School	0.093	0.081	0.092	**0.088**
Aiken	45-003-0004	Wagener DOT	0.075	0.079	0.089	0.081
Anderson	45-007-0003	Powdersville	0.084	0.088	0.093	**0.088**
Barnwell	45-011-0001	Barnwell CMS	0.090	0.074	0.086	0.083
Berkeley	45-015-0002	Bushy Park Pump	0.080	0.071	0.074	0.075
Charleston	45-019-0042	U S Army Reserve	0.082	0.068	0.074	0.074
Charleston	45-019-0046	Cape Romain Wildlife Refuge	0.076	0.068	0.074	0.072

Table 2 State of South Carolina 2000 - 2002 Design Values						
County	Site ID	Site Name	4th Maximum 8-Hr. (ppm)			Design Value (ppm)
			2000	2001	2002	
Cherokee	45-021-0002	Cowpens National Battle Ground	0.088	0.080	0.093	**0.087**
Chester	45-023-0002	Chester Airport	0.078	0.083	0.093	0.084
Colleton	45-029-0002	Ashton	0.080	0.076	0.085	0.080
Darlington	45-031-0003	Pee Dee Exp. Station	0.087	0.081	0.090	**0.086**
Edgefield	45-037-0001	Trenton	0.079	0.077	0.094	0.083
Oconee	45-073-0001	Round Mt. Fire Tower (Long Creek)	0.082	0.078	0.094	0.084
Pickens	45-077-0002	Clemson CMS	0.081	0.088	0.088	**0.085**
Richland*	45-079-0007	Parklane - State Park Health Ctr	0.096	0.082	0.084	**0.087**
Richland*	45-079-0021	Congaree Bluff	0.073	0.076	0.082	0.077
Spartanburg	45-083-0009	North Spartanburg Fire Station	0.089	0.090	0.093	**0.090**
Union	45-087-0001	Delta	0.079	0.079	0.085	0.081
Williamsburg	45-089-0001	Indiantown	0.077	0.067	0.077	0.073
York	45-091-0006	York CMS	0.076	0.080	0.096	0.084

**An additional monitor in Richland County is not listed since it was relocated within the county in 2002 and does not have three years of data from the same location.*

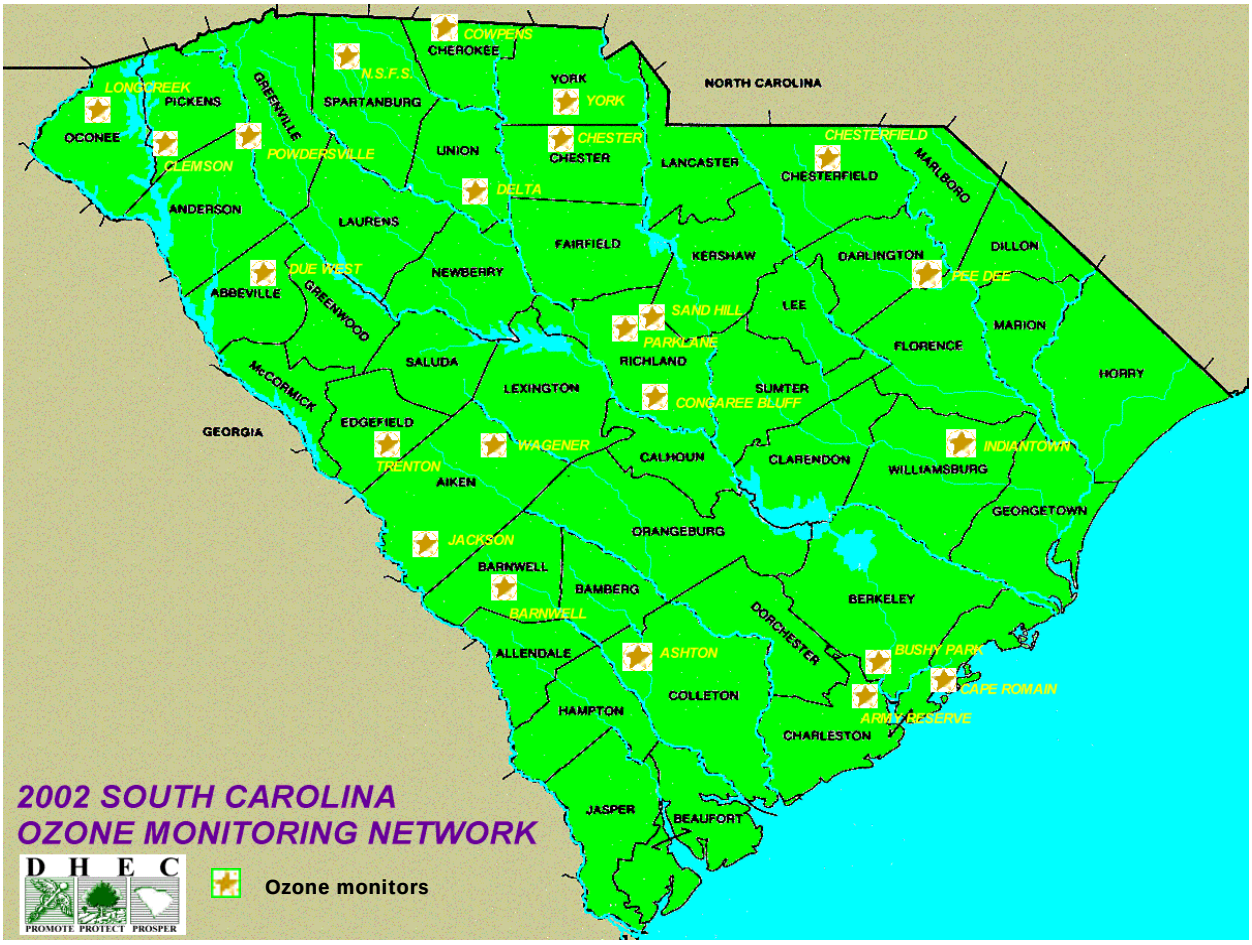
The Department respectfully requests to be allowed to update this recommendation with the latest quality assured air quality data before final designations are made.

Section IV. Ozone Monitoring Network

The Department has developed an extensive ozone monitoring network to establish general or background information in rural areas, to determine the effects of NO_x and/or VOC emissions from specific sources, to monitor concentrations in suburban and urban areas, and to ascertain interstate and intrastate transport. In 2002 there were twenty-one (21) ozone monitors, strategically located throughout the State, with at least three years of quality assured data. These monitors were located in accordance with EPA monitor citing guidance. (See Figure 1).

Aiken County, Charleston County, and Richland County have multiple ozone monitoring sites with at least three years of quality assured data. In Charleston County both monitors indicate attainment of the ozone standards. In both Aiken and Richland Counties, one monitor indicates attainment of the standards while the second monitor indicates design values above the standards. In light of this fact, the Department does not regard county lines as the most suitable boundary for nonattainment areas.

Figure 1: 2002 SC Ozone Monitoring Network



Section V. Factors Common to All Areas

The meteorology (weather/transport patterns), geography/topography (mountain ranges or other air basin boundaries), jurisdictional boundaries, emission control strategies, and regional emission reductions (e.g., NO_x SIP Call or other enforceable regional strategies) contain factors common to all seven of the recommended nonattainment area boundaries. These factors will be addressed in this section of the document and labeled as:

G. Meteorology (weather/transport patterns),
H. Geography/topography (mountain ranges or other air basin boundaries),
I. Jurisdictional boundaries (e.g., counties, air districts, existing 1-hour nonattainment areas, Reservations, etc.)
J. Level of control of emission sources,
K. Regional emission reductions (e.g., NO_x SIP Call or other enforceable regional strategies).

These headings correspond with the factors listed in Section II and will help eliminate duplication in each of the supporting documents for the seven recommended nonattainment areas.

G. Climatology / Meteorology

The overall climatology of an area is paramount to the formation and mass movement of secondary pollutants such as ozone throughout the lowest layers of the troposphere. As a result, though the overall emission volume may remain constant across a given monitoring site, the ambient concentration of ozone at that site may change according to even the most subtle shift in the overall weather pattern. This is indeed the rule across the whole of the State of South Carolina.

The "Ozone Season" in South Carolina runs from April 1 through October 31 of each year, roughly parallel to that experienced in most areas of the Southeastern United States. The main climatological feature influencing the overall weather pattern during this period is a large ridge of stable, sinking air known as the "Bermuda High." This semi-permanent feature is normally situated just off the South Atlantic Seaboard, with its core of anticyclonic circulation centered due east of South Carolina. The average strength and position of this ridge provides a steady southwesterly flow of moist, tropical air from the Gulf of Mexico that, under normal circumstances, keeps the lower atmosphere well mixed and quite humid. These are two main factors that normally provide conditions non-conducive to the formation of elevated levels of ozone.

When the Bermuda High becomes anomalously shifted from its normal position, conditions conducive to the formation of elevated ozone may occur in many areas of South Carolina. This is mainly the case in the months during the Ozone Season immediately following an El Nino winter. During this period, which only occurs once every 4 or 5 years, the Bermuda High flattens out and builds southwestward well into the Gulf of Mexico. This shifts the moist flow out of the Gulf to the west, well away from the South Atlantic Coast. With the core of the ridge virtually parked on top of South Carolina, air stagnation can occur.

The three main underlying causes of air stagnation under this shifted Bermuda High are lack of horizontal wind flow, a stable boundary layer, and, most importantly, reduced availability of ambient moisture. In such a situation, the lower atmosphere dries out considerably, with less cloud coverage available to absorb the incoming solar radiation (UV) needed for efficient conversion of ozone from its primary component pollutants. In addition, there is much less titration and/or deposition of the pollutant back to its basal components after nightfall, when the UV source is removed. Once ozone formation perpetuates, the stable air mass traps it, pooling it closer to the ground. With little horizontal wind flow available to mix the atmosphere, the pollutant takes much longer to disperse throughout the boundary layer.

Air stagnation under an anomalous Bermuda High occurs far too sparingly to account for every elevated ozone event in South Carolina. Frequently, elevated ozone readings have been monitored when conditions were not altogether favorable for its production in that particular area. It is in these cases where transport of ozone from upwind sources comes into play.

H. Geography / Topography

The topography of South Carolina is divided into two distinct areas, commonly known as the Piedmont and the Coastal Plain. The line of demarcation runs from the eastern boundary of Aiken County through central Chesterfield County to the North Carolina border. Along this line elevations begin at about 300 feet and increase in steps to over 1,000 feet in the extreme northwestern counties, culminating in isolated peaks of 2,000 to over 3,500 feet above mean sea level. East of the line, there are evidences of outcroppings from the lower Appalachians in a ridge of low hills and rather broken country between the

Congaree River and the north fork of the Edisto River, and also in a rather hilly and rolling region in the upper Lynches River drainage basin between the Catawba-Wateree and the Great Pee Dee Rivers. In about one-third of the coastal plain (or what is commonly known as the upper coastal plain), the elevations decrease rather abruptly from 300 to 100 feet, thence to the coast. The major part of the coastal area is not over 60 feet above mean sea level. In this region of lower levels, to the eastward and southward, the great swamp systems of the State predominate.

The slope of the land from the mountains seaward is toward the southeast, and all of South Carolina's streams naturally follow that general direction to the Atlantic Ocean. The South Piedmont section of the State is on the eastern slope of the Appalachian Mountains with the main ridge of the mountains about 30 miles west. To some extent these mountains act as a barrier for the wind and tend to protect the area from the full force of the cold air masses during the winter months. The relatively flat areas of the Central Plains and the coastal region allow free air movement and are conducive to effective dispersion of pollutants.

I. Jurisdictional boundaries

Metropolitan Planning Organizations

Metropolitan areas are the nation's economic engines. Almost three-quarters of US citizens live and work in these urbanized regions. Metropolitan Planning Organizations (MPO) are designated for each urbanized area with a population exceeding 50,000 as measured in the latest decennial census. There may be more than one MPO in each MSA. Metropolitan Planning Organizations are required to develop a unified planning work program. The unified planning work program describes planning activities, discusses planning priorities facing the area, and describes all metropolitan transportation and transportation related air quality planning activities. The quality of each metropolitan transportation infrastructure - highways, bridges, airports, transit systems, rails, and ports - is a primary factor in American economic competitiveness.[1]

The Intermodal Surface Transportation Efficiency Act (ISTEA) was designed to put in place a framework to guide the operations, management and investment in a surface transportation system that is largely in place. The legislation strengthened the metropolitan planning process, enhanced the role of local elected officials, required stakeholder involvement, and encouraged movement toward integrated, modally mixed strategies for greater system efficiency, mobility and access. Highway funding levels since 1992 have provided for a state's dual goals of relieving congestion and reducing emissions. The Congestion Mitigation and Air Quality Improvement program, was established under the Transportation Equity Act for the 21st Century (TEA-21), a law Congress expects to reauthorize this session. As a condition for spending Federal highway or transit funds in urbanized areas, the Federal highway and transit statutes require the designation of MPOs, which have responsibility for planning, programming, and coordination of Federal highway and transit investments. The various MPOs are responsible for predicting future growth and planning for development in their respective jurisdictional areas. Transportation Enhancement funds are allocated through these organizations. Proposed projects are evaluated and approved by the members of the MPO (primarily elected officials) and funded in the area's Transportation Improvement Program (TIP). Additionally, much of the detailed information needed for transportation planning and conformity determinations are based on data from within the MPO boundaries.

The area covered by each MPO includes the current urbanized areas and all contiguous areas likely to

[1] Association of Metropolitan Planning Organizations

be urbanized within 20 years.[2] Geographical boundaries for the MPO are established by the MPO itself in agreement with the Governor of each state. These boundaries are defined by a distinct geographical area and are updated and reviewed every five years. States and MPOs annually certify to the Federal Highway Administration that their metropolitan transportation planning process is addressing the major issues facing their area and is being conducted in accordance with applicable Federal requirements.

Based on air quality monitoring data from 2000 – 2002, areas that represent several of the existing South Carolina MPO jurisdictional boundaries are being recommended for designation as nonattainment areas for the new 8-hour ozone standard. Nonattainment area boundaries based on the jurisdictional boundaries of the MPOs will promote local solutions to local problems and facilitate development and implementation of more specific SIP elements to help each nonattainment area attain the air quality standard as expeditiously as possible.

Metropolitan Statistical Areas

As a part of the review of the data and information, the Department considered county lines and/or Metropolitan Statistical Areas (MSA) as the boundaries for recommended nonattainment area designations but has determined that such nonattainment area boundaries would lead to inefficiency in the coordination of State Implementation Plan (SIP) development and implementation of control measures. MSA boundaries are based on city and county populations in urbanized areas, with "outlying counties" being included in the MSA contingent upon their commuting patterns into the central counties. Under the standards, the county (or counties) that contains the largest city becomes the "central county" (counties), along with any adjacent counties that have at least 50 percent of their populations in the urbanized area surrounding the largest city. The MSA is named according to the populations of the largest central cities.

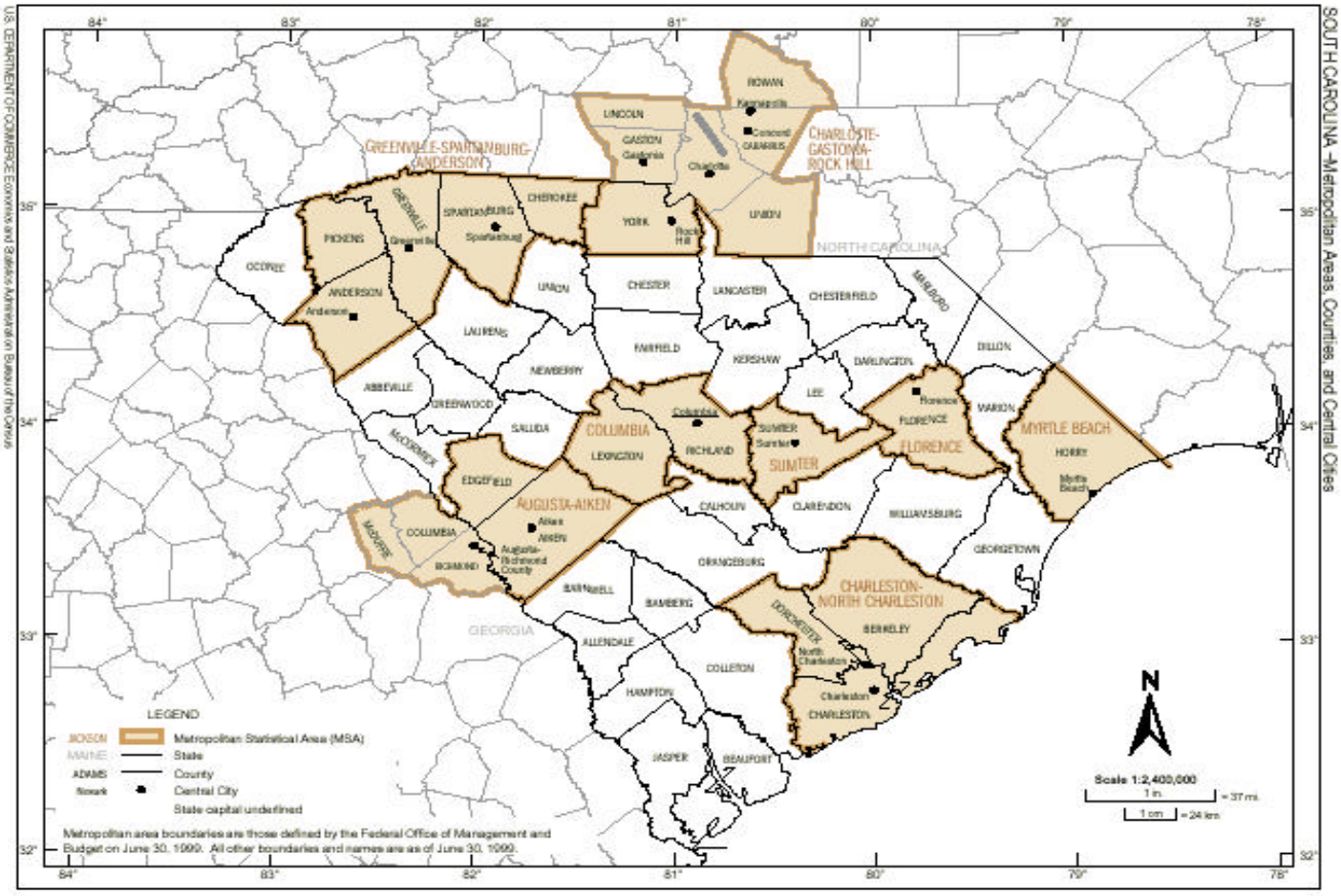
Figure 2 shows the sixteen South Carolina counties that are incorporated in eight separate MSAs. In South Carolina, two MSA have multiple MPOs located within its boundaries, these MSAs cross State lines. The York MPO is located in the "Charlotte - Gastonia - Rock Hill, NC-SC MSA" along with the various North Carolina MPOs. The Aiken MPO is in the "Augusta - Aiken, GA-SC MSA." The "Greenville - Spartanburg - Anderson, SC MSA" incorporates the Anderson MPO, Greenville MPO, and Spartanburg MPO. The "Columbia, SC MSA" incorporates the Columbia MPO, and the "Florence, SC MSA" incorporates the Florence MPO. County lines and MSAs do not consider the jurisdictional boundaries of the various State and local governments and their MPO, whose jurisdictional boundaries may cross county lines.

Many of the counties in the individual MSAs have large areas designated as rural. Typically, these rural areas have very few, if any, stationary sources that make a significant contribution to the ozone concentrations measured in the area, or in other areas. In the Augusta - Aiken, GA-SC MSA, Edgefield County, an outlying county, and a large portion of Aiken County are primarily rural. Also, the Florence, SC MSA has significant land area designated as rural.

Furthermore, the Department does not consider MSA boundaries a reliable tool for the designation of nonattainment areas. The data from the twenty-one ozone monitoring sites indicate that several areas demonstrating attainment of the air quality standard would be declared nonattainment areas simply due to the fact that the county is incorporated within an MSA and not due to the air quality or emissions within the area.

[2] Travel Model Improvement Program

Figure 2 [3]
State of South Carolina
Metropolitan Statistical Areas for 1990



1. Augusta-Aiken, GA-SC MSA (SC - Aiken, Edgefield; GA - Richmond, Columbia, McDuffie Counties)
2. Greenville-Spartanburg-Anderson, SC MSA (Cherokee, Spartanburg, Greenville, Pickens, Anderson Counties)
3. Charleston-North Charleston, SC MSA (Berkeley, Charleston, Dorchester Counties)
4. Florence, SC MSA (Florence County)
5. Myrtle Beach, SC MSA (Horry County)
6. Columbia, SC MSA (Lexington and Richland Counties)
7. Sumter, SC MSA (Sumter County)
8. Charlotte-Gastonia-Rock Hill, NC-SC MSA (NC - Cabarrus, Gaston, Lincoln, Mecklenburg, Rowan, Union; SC - York Counties)

[3] U.S. Department of Commerce, Economics and Statistics Administration, Bureau of the Census

Office of Environmental Quality Control - Regional Offices

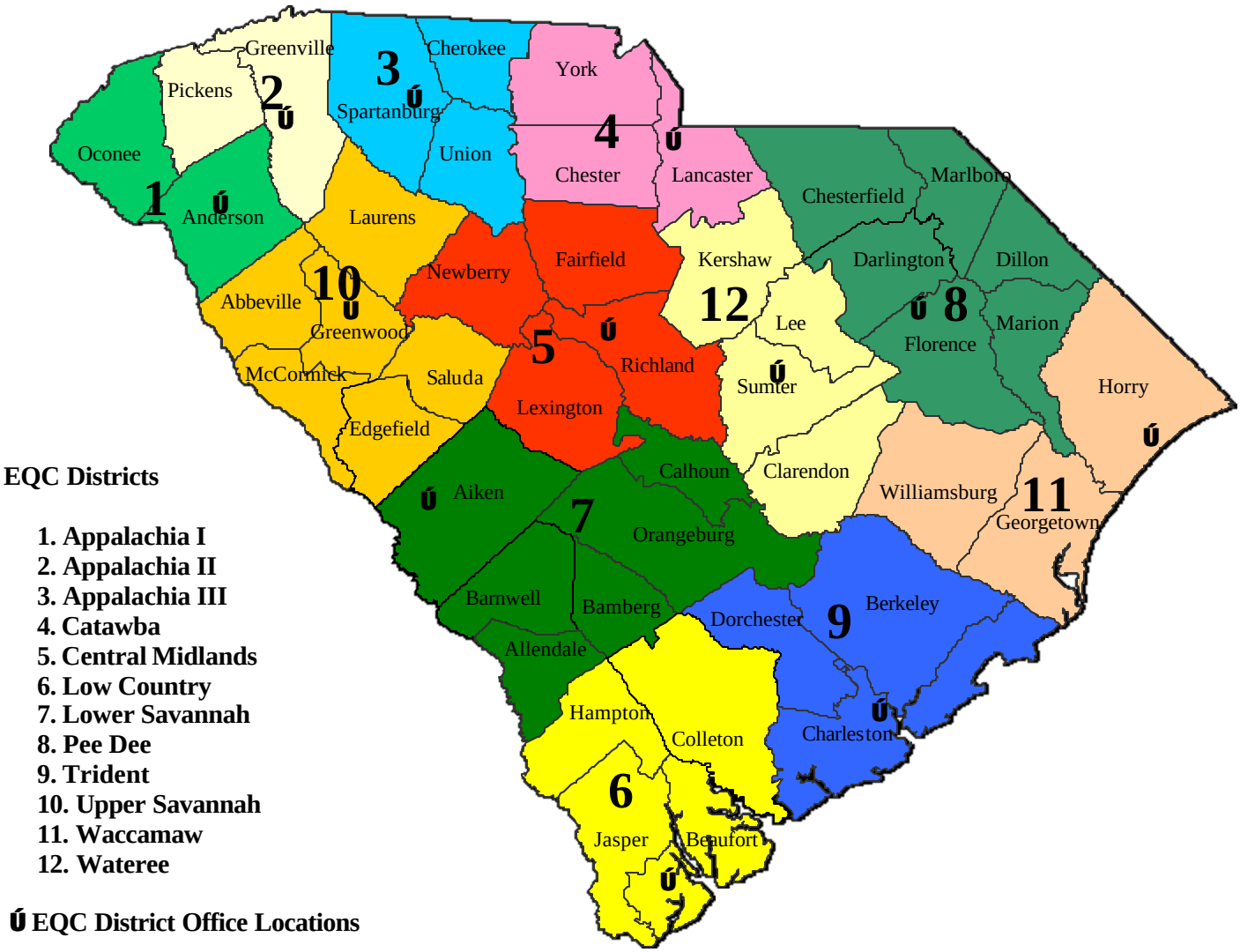
The Office of Environmental Quality Control (EQC) is the environmental regulatory arm of the South Carolina Department of Health and Environmental Control. EQC is responsible for the enforcement of Federal and State environmental laws and regulations, and for the issuing of permits, licenses and certifications for activities that may affect the environment. EQC is composed of four program areas, the Bureau of Air Quality, the Bureau of Land and Waste Management, the Bureau of Water, and the Bureau of Environmental Services.

The EQC Districts assist in implementation of the various State plans developed to ensure maintenance or attainment of the air quality standards. Twelve regional EQC offices, under the Bureau of Environmental Services, are located strategically across the State (Figure 3). Regional field staff provides direct support services to the EQC program areas and the general public. EQC District Services include emergency response activities, environmental monitoring for EQC bureau programs (Air Quality, Water, Land and Waste Management), facility inspections and evaluations, technical assistance, on-site presence at certain commercial hazardous waste facilities, shellfish regulation, and a summer pool inspection program. Particular emphasis is placed on the investigation and resolution of complaints associated with environmental and public health issues. Regional personnel also work closely with facility owners and operators to provide technical assistance and identify potential system problems before they present a risk to the environment or public health.

The EQC District Services air quality staff carries out a number of services designed to assist in protecting and maintaining the quality of the air in South Carolina. One of the primary responsibilities of the district air quality staff is to respond to all customer complaints involving excessive emissions, odors, and open burning. Another area of responsibility involves facility compliance. Facilities (sources) in each district are inspected each year for compliance with operation and maintenance and visible emissions requirements. Inspecting new sources for operating permits and ensuring that all sources have a current operating permit are also activities handled by the district air quality staff. District staff also maintains continuous air quality monitoring stations. Long term trends for particulate matter, ozone, SO_x and NO_x concentrations are monitored. Results from each of the district monitoring programs are combined, and used to provide a comprehensive picture of the air quality in South Carolina. Through compliance inspections, complaint response and monitoring activities, the district air quality staff helps to ensure that ambient air quality is maintained at the highest possible level.

Figure 3

South Carolina Department of Health and Environmental Control
Environmental Quality Control Regional Offices



EQC Districts

1. **Appalachia I**
2. **Appalachia II**
3. **Appalachia III**
4. **Catawba**
5. **Central Midlands**
6. **Low Country**
7. **Lower Savannah**
8. **Pee Dee**
9. **Trident**
10. **Upper Savannah**
11. **Waccamaw**
12. **Wateree**

EQC District Office Locations

J. Emission Control Strategies

The Department is primarily responsible for ensuring attainment and maintenance of the air quality standards established by EPA. Under section 110 of the CAA and related provisions, the Department must submit, for EPA approval, State implementation plans that provide for the attainment and maintenance of such standards through control programs directed to sources of the pollutants involved. The Department, in conjunction with EPA, also administers the prevention of significant deterioration (PSD) programs for these pollutants. In addition, Federal programs provide for nationwide reductions in emissions of these and other air pollutants under Title II of the CAA, which involves controls for automobile, truck, bus, motorcycle, off-road engine, and aircraft emissions. Since its inception in 1973, the Department has worked diligently to carry out the task of enforcing the CAA. The Department has also been delegated the authority to administer the new source performance standards under section 111 of the CAA and the national emission standards for hazardous air pollutants under section 112 of the CAA. During the past decade, the air quality in South Carolina has complied with all air quality standards, an accomplishment very few other States can claim.

Sources of NO_x and VOC emissions have been inventoried and are listed in tables in the individual recommended boundary areas. In addition, an inventory of facilities in rural areas and counties having potential NO_x and VOC emissions of more than 100 TPY has been prepared and will also be discussed in each section.

If additional control measures are required to attain the air quality standard, the Department has the statutory authority to promulgate and implement regulations and to require more stringent controls on industrial and mobile sources to realize appropriate emissions reductions outside of nonattainment areas.

Figure 4:

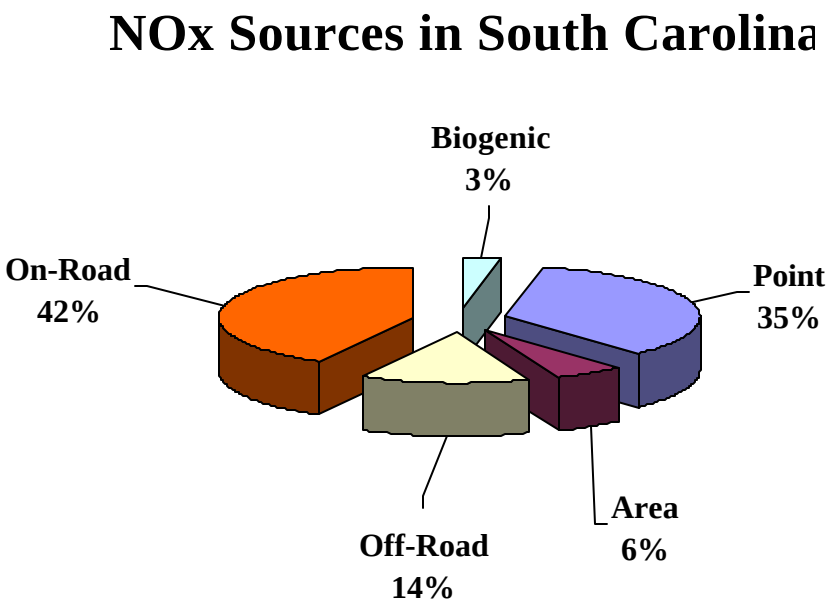
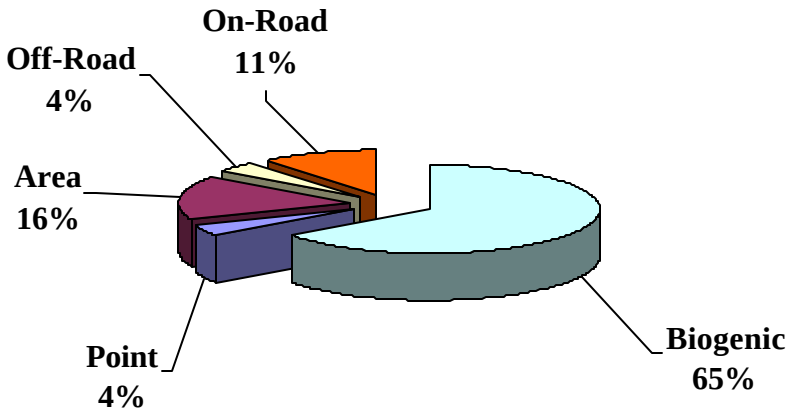


Figure 5:

VOC Sources in South Carolina



Figures 4 and 5 above illustrate the generic breakdown of the sources of NO_x and VOC in the State. On-road mobile sources of pollution include most forms of transportation such as automobiles, trucks, and airplanes. Off-road mobile sources include a wide variety of internal combustion engines not associated with highway vehicles. Examples of off-road mobile source would be construction equipment, lawn mowers, and boats. A point source of pollution refers to a source at a fixed point, such as a smokestack or storage tank, that emits air pollutants. An area source refers to a series of small sources that together can affect air quality in a region. Examples of area sources include gas stations and residential natural gas units. Biogenic emissions are emissions that originate from natural sources such as vegetation.

The Department recognizes the importance of controlling large concentrated emissions in urban areas but also recognizes the impact of ozone transport from areas outside of nonattainment boundaries. The latest air quality models and extensive emission inventories have been utilized to project the impact various parameters have in the urban and non-urban areas of South Carolina. The Department placed ozone monitors in rural or isolated areas throughout the State, as discussed in Section IV *Ozone Monitoring Network*; these strategically placed monitoring sites have been beneficial to the Department in ascertaining levels upwind of urban areas and analyzing ozone transport from areas inside and outside of the State.

Early Action Plan

The health of the citizens of South Carolina is a primary concern and the Department continues to seek proactive measures to meet our commitment to public health and environmental protection. South Carolina has been in attainment of the 1-hour ozone standard for the past decade, and will make every effort to attain the new 8-hour ozone air quality standard in all areas of the State as expeditiously as possible.

EPA has provided an option for areas currently meeting the 1-hour ozone standard, like those in South Carolina, to attain the 8-hour ozone standard by December 31, 2007, and obtain cleaner air sooner than Federally mandated. This option requires an expeditious time line for achieving emissions reductions

sooner than expected under the 8-hour ozone implementation rulemaking, while providing "fail-safe" provisions for the area to revert to the traditional SIP process if specific milestones are not met. Forty-five of South Carolina's forty-six counties have entered into Early Action Compacts. This action indicates that the local governments in the State of South Carolina are very concerned with air quality. Many of the counties entering into the Early Action Compacts do not have problems meeting the air quality standard and yet are still willing to plan and work with other areas to implement controls to ensure early attainment of the standards.

Interested stakeholders (i.e., local, State, and Federal government, citizens, public interest groups, and the business community) have been and will continue to be involved in the planning. By signing the Early Action Compact (EAC), EPA is agreeing to defer the effective date of the nonattainment designation for participating areas. However, areas that enter into an EAC but do not meet all of the terms of the EAC, including established milestones, will forfeit participation and be designated according to requirements within EPA's 8-hour ozone implementation rule. At a minimum, those requirements will include Transportation Conformity and nonattainment New Source Review.

Local areas are required to develop and implement a local early action plan that will promote the area's attainment by December 31, 2007, and maintenance of the standard until at least 2012. The local area must adopt local control strategies necessary to demonstrate attainment of the 8-hour ozone standard. The draft local plan is due to the Department by August 31, 2003.

The Department is required to develop and implement a State early action SIP demonstrating the participating area's attainment by December 31, 2007, and maintenance until at least 2012. The Department is currently evaluating the possibility of projecting out to 2017 to evaluate the air quality ten years after the "attainment" date. The SIP is due to EPA by December 31, 2004. The State must adopt local control strategies necessary to demonstrate attainment of the 8-hour ozone standard. Potential control strategies were identified to EPA on June 16, 2003. Final strategies are to be implemented no later than April 1, 2005. If the monitors in the nonattainment areas reflect attainment by December 31, 2007, the area will be designated as attainment and no additional requirements will be imposed (i.e., Transportation Conformity and nonattainment New Source Review).

Ozone Forecasting – Spare The Air

The South Carolina Spare the Air campaign was created by the Department's Bureau of Air Quality to educate citizens about air quality and its relationship to their health. This program provides information to the public about their air quality and warns them when levels of ozone are expected to be elevated so that they can better protect their health as well as allow them the opportunity to take actions to reduce emissions from their own activities. During the period of May 1 through September 30, the Bureau of Air Quality staff meteorologists produce daily ozone forecasts for the Upstate, Midlands, Pee Dee, and Central Savannah River area. The forecasts are provided utilizing the Air Quality Index (AQI) color scale to indicate levels of ozone in the air. Each category in the AQI is represented by a color and includes a cautionary statement for air quality conditions and the appropriate citizen response. Green represents the level being good, yellow for moderate conditions, orange for unhealthy to sensitive groups, and red for unhealthy to everyone.

Currently, the Department provides ozone forecasts to 26 of the 46 counties in the state (see Figure 6). These forecasts are aimed at 61.44% of the population of South Carolina. Due to limited resources, citizens in the Catawba area (Chester, Lancaster, and York counties) are referred to the North Carolina Department of Environment and Natural Resources (NC DENR) Charlotte area forecast. The Department recognizes that the Catawba area is not always similar to the Charlotte area forecast but additional resources are needed to provide a separate specific forecast.

The forecasts are broadcast on local television and radio stations during the daily weather forecasts, distributed by email or fax to over 300 businesses, industries, organizations, and individuals, and through an agency-created website (www.scdhec.net/baq/ozone). In the high traffic areas surrounding Columbia and Greenville, warnings are also posted on Department of Transportation's message boards along the major interstates. To promote the efforts, Governor Mark Sanford declared the first week of May, 2003, "Ozone Awareness Week." The Department also hosts official "Ozone Season Kick-Off Events" around the state to annually review the warning system and ozone reduction opportunities within South Carolina.

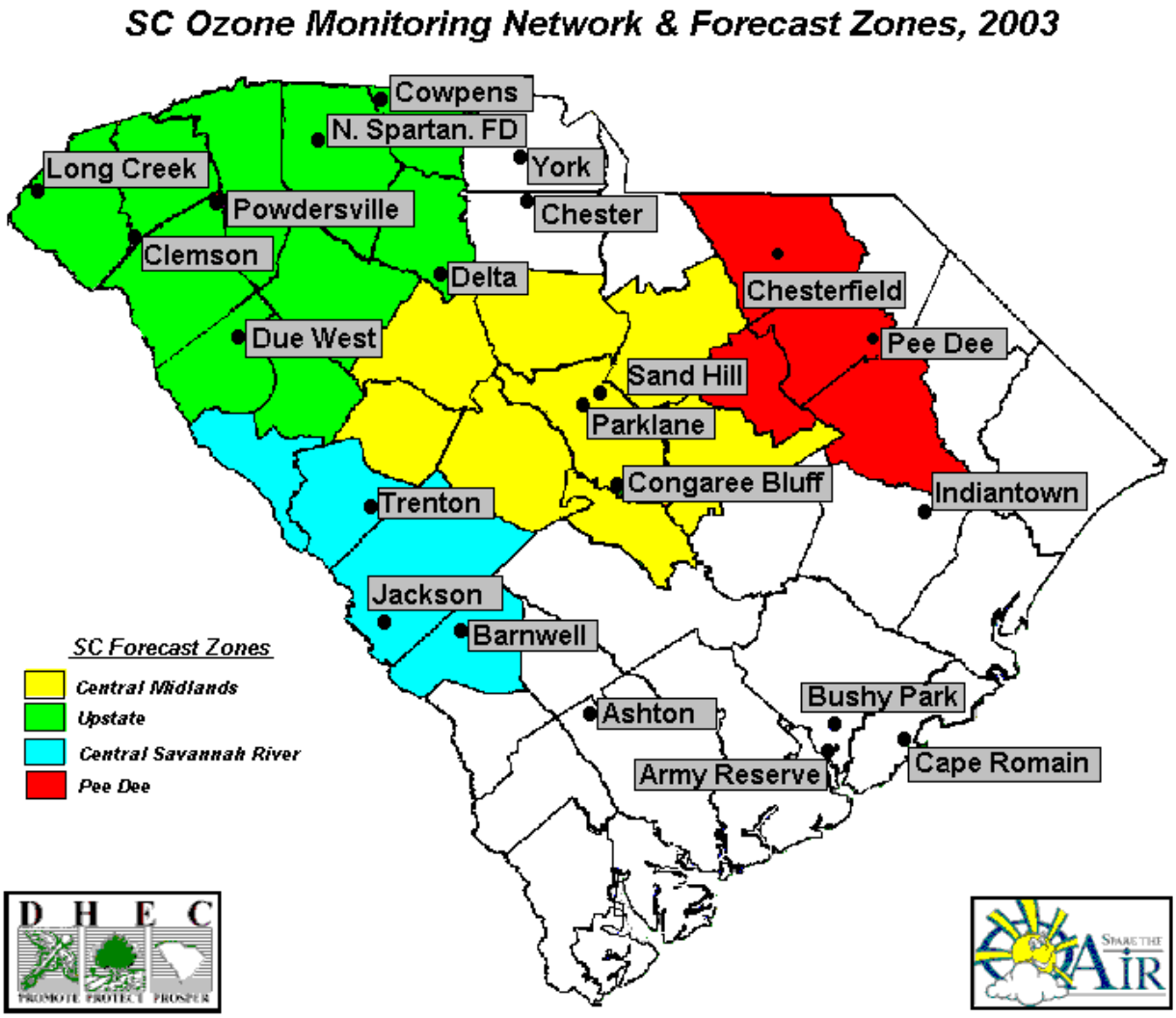


Figure 6: Ozone Forecasting Map

Ozone Education and Outreach

Additionally, other elements that fall under the "Spare the Air" initiative involve education and outreach to school-aged youth and persons with chronic respiratory conditions. In cooperation with the

Department's Bureau of Land and Waste Management, air quality training in the environmental curriculum titled "Action for a Cleaner Tomorrow" is provided to teachers across the state. To assist Department efforts in preventing future air pollution, the Bureau of Air Quality staff work with teachers and students through classroom resources such as prepared special lesson plans, presentations, and exhibits. Teachers are also encouraged to participate in the "Ozone Action Classroom" initiative to educate students on the dangers of ground-level ozone. Additional partners in the "Ozone Action Classroom" include the South Carolina Asthma Planning Alliance and the South Carolina Public Health Association. These groups are together, and individually, working to promote awareness of the link between ground-level ozone and air quality conditions that can trigger asthma attacks in persons with respiratory conditions.

State VOC LAER and RACT

The Department has the authority to require controls on any source that impacts the ambient air quality and will pursue any necessary additional controls on industry and transportation. South Carolina currently has two separate standards that regulate VOC emissions. South Carolina Regulation 61-62.5, Standard 5.1, Lowest Achievable Emission Rate (LAER) applies to all new, modified, or altered sources that would increase VOC emissions. LAER is applied to new construction or modifications when the net VOC emissions increase exceeds 100 tons per year. In addition, Regulation 61-62.5, Standard 5, is applicable to existing sources and outlines the Reasonably Available Control Technology (RACT) for VOC.

Permitting Program

In South Carolina anyone who plans to construct, add to, or alter a source of air contaminants must first submit an application for a permit. Once a construction permit is issued (or construction approved), the applicant may then begin construction after waiting the required time period. Once construction has been completed, the applicant then requests a permit to operate. An operating permit can take several different forms based upon the quantity of the pollutant(s) to be emitted. In South Carolina permits are not only required for "major" sources (sources with emissions exceeding federal thresholds); they are also required for facilities emitting smaller quantities as well. This comprehensive permitting process allows more control over sources of emissions within South Carolina.

Smoke Management Program

South Carolina has a Smoke Management Program (SMP) that is certified in accordance with EPA's *Interim Air Quality Policy on Wildland and Prescribed Fires (April 23, 1998).* The SMP involves coordination between the Department and the South Carolina Forestry Commission when addressing the impact of smoke on air quality by following guidelines that define smoke sensitive areas, amounts of vegetative debris that may be burned, and atmospheric conditions suitable for burning. The SMP can be used as a management tool for reducing ozone levels.

Government Fleets

In 1992 the U.S. Congress passed legislation to promote the use of alternative fuel vehicles (AFVs). This legislation was passed to improve air quality and reduce the nation's dependence on foreign oil. The new legislation became known as the Energy Policy Act (EPAct). This Act requires that all Federal and State fleets, as well as private sector fuel providers such as utilities, begin purchasing AFVs by 1994. Over a period of seven years, EPAct required a gradual phase-in of the purchase of AFVs. By 2001 EPAct required that 75% of Federal and State fleets be composed of AFVs. To date, South Carolina is in compliance with all EPAct requirements because of a cooperative effort within the State agencies and the

operation of a unified State plan. [4]

On October 18, 2001, former Governor Hodges signed an Executive Order in strong support of the use of alternative fuels. The Order states that whenever practical and economically feasible, State agencies use alternative fuels when operating alternative fuel vehicles (See attachment: Executive Order No. 2001-35).

Currently, the State operates 1,370 alternative fuel vehicles. The types of alternative fuel vehicles that the State operates include the Bi-fuel Ford F-150, Flex Fuel Taurus, Dodge Caravan, and Chevrolet S-10 Pick-up. By purchasing alternative fuel vehicles, the State is making a viable effort to reduce mobile source emissions in South Carolina. An ethanol pump has been installed in the Columbia area so that the flex fuel vehicles can provide the designed benefits. The State fleet also operates hybrid vehicles such as the Honda Insight and Toyota Prius.

K. Regional/National Emission Reductions

In addition to the initiatives and regulations that have been implemented to reduce the level of VOC emissions, standards to reduce NO_x levels have also been supported on the national level. These final and proposed new national standards will provide tremendous air quality benefits, particularly those that will address pollution from mobile sources. As noted in the pie chart for statewide NO_x emissions (Figure 4), mobile sources significantly contribute to air pollution in South Carolina. Strong national programs are the only way to adequately, economically, equitably, and reasonably address pollution from this source sector. The Department believes that the implementation of these regulations and reduction efforts will provide significant assistance towards statewide compliance with the air quality standards, especially in the areas where it is needed the most, our urbanized areas.

Standards For Tailpipe Emissions

Tier 2 is a tailpipe emissions rule that sets new and more stringent exhaust standards. This standard focuses on reducing emissions of ozone-forming gases (NO_x and PM) and applies to new passenger cars and light-duty trucks. The phase-in of the tailpipe emissions standards will begin in 2004 for passenger cars and light-duty trucks. This standard will be completely phased-in by 2007. The phase-in period for heavy-duty light trucks (HDLTs) and medium-duty passenger vehicles (MDPVs) begins in 2008. The standard will be completely phased-in for this group by 2009. Tier 2 standards will reduce new vehicle NO_x levels to an average of 0.07 grams/mile. [5]

Gasoline Sulfur Standards

The gasoline sulfur standards focus on reducing average sulfur level in gasoline to 30 ppm. Refiners and importers will be required to meet a corporate average gasoline standard of 120 ppm and a cap of 300 ppm beginning in 2004. This standard will then be reduced to 30 ppm with a cap of 80 ppm. Implementation of these standards will be the equivalent of taking 164 million cars off the road. [5]

Standards For Heavy-Duty Engines

The new standard for heavy-duty engines will also help to reduce mobile source emissions. This

[4] South Carolina State Budget and Control Board, General Services Division, Office of State Fleet Management

[5] U.S. EPA Office of Transportation and Air Quality

standard will become 100% effective for diesels beginning in the 2007 model year. Included in this standard is a reduction for NO_x and non-methane hydrocarbons. The reduction requires a reduction of 0.20 gram/brake horse-power-hour (g/bhp-hr). The phase-in period for this requirement will be between 2007 and 2010 for diesel engines.

Highway Diesel Fuel Sulfur Standards

On June 1, 2006, refiners will be required to start producing diesel for use in highway vehicles with a sulfur content of no more than 15 ppm. Highway diesel fuel sold as low sulfur fuel at the terminals will be required to meet the 15 ppm sulfur standard by July 15, 2006. Highway diesel fuel sold as low sulfur fuel by retail station and fleets must meet the 15 ppm sulfur standard by September 1, 2006. By mid 2006, this standard will reduce sulfur levels in diesel by 97 percent.

Non-Road Diesel Engines and Fuel

EPA recently proposed emissions reductions from off-road diesel engines and low-sulfur fuel requirements for these same engines. By 2014 emissions should be reduced by more than 90 percent and when fully phased in, NO_x emissions from this equipment would be reduced by 825,000 tons. Beginning in 2007, the sulfur content in the diesel fuel used in these off-road engines would be reduced from an uncontrolled 3,400 parts per million to 500 ppm in 2007 and then to 15 ppm in 2010. As non-road engines make up 5.21% of the NO_x inventory in South Carolina, emission reductions from this sector will be a tremendous benefit to our air quality.

NO_x SIP Call

The NO_x State Implementation Plan (SIP) Call is the common name given to a final rule that EPA published on October 27, 1998 (63 FR 57355). The rule requires South Carolina and numerous other states to reduce their summertime emissions of NO_x in order to reduce the interstate transport of ozone and its precursors.

To facilitate these reductions, the rule establishes a NO_x budget trading program in which each applicable state is given a summertime NO_x budget which they cannot exceed. The budget for each state assumes certain reductions on specific types of units. The units involved in the trading program are units that serve a generator with a nameplate capacity greater than 25 MWe, referred to as electrical generating units (EGUs); and large boilers that have a maximum design heat input greater than 250 mm Btu/hr, referred to as non-EGUs. The budget for EGUs is based upon 85 percent reductions from uncontrolled levels while the budget for the non-EGU category is based on 60 percent reductions from uncontrolled levels. The rule also calls for controls on cement kilns and large internal combustion engines, but these units are not part of the trading program.

South Carolina's NO_x budget for sources subject to the NO_x SIP Call was reduced from a baseline of 156,137 tons to 128,524 tons. This reflects a drop in overall, summertime NO_x emissions of 18 percent.

The rule allows the regulated community a great deal of flexibility. Rather than dictate the types and levels of controls, sources subject to the rule have the ability to determine where it is most cost effective to apply pollution controls. As a result, there is less certainty for states in terms of predicting where NO_x reductions may occur. So for instance, sources may choose to install pollution control equipment and sell their surplus NO_x allowance or they may choose not to install controls and simply buy the NO_x allowances they need. One significant constraint is that from May 1 to September 30 of each year, units subject to the requirements of the NO_x SIP Call must have an allowance of NO_x for every ton of NO_x that they emit.

Table 3
South Carolina's NO_x Budget for Sources Subject to the NO_x SIP Call

FACILITY	COUNTY	NO_X BEFORE SIP CALL tons/ozone season	NO_x ALLOCATION tons/ozone season
Electric Generating Units (EGUs)			
CP&L - Robinson	Darlington	2,088	723
Duke - Lee Steam Plant	Anderson	1,482	705
Santee Cooper - Cross	Berkeley	5,017	2,847
Santee Cooper - Grainger	Horry	1,309	398
Santee Cooper - Hilton Head	Beaufort	68	12
Santee Cooper - Winyah	Georgetown	9,454	2,908
Santee Cooper - Jeffries	Berkeley	3,514	848
Santee Cooper - Myrtle Beach	Horry	64	8
SCE&G - Canadys	Colleton	1,230	978
SCE&G - Cope	Orangeburg	1,635	1,181
SCE&G - Hagood	Charleston	57	51
SCE&G - McMeekin	Lexington	1,594	704
SCE&G - Urquhart	Aiken	1,761	643
SCE&G - Wateree	Richland	4,320	1,674
SCE&G - Williams	Berkeley	5,010	1,714
Non-EGUs *			
Bowater	York	529	546
Voridian	Calhoun	589	594
Celanese Acetate	York	1,039	960
Dupont - May Plant	Kershaw	553	584
IP - Eastover	Richland	771	912
Sonoco - Hartsville	Darlington	418	458
Springs Ind. - Grace Plant	Lancaster	501	426
Stone Container	Florence	1,220	1,366
Cogen South	Charleston	560	748
Willamette	Marlboro	371	385

** As not all units in a non-EGU are subject to the NO_x SIP Call, ozone season emissions have been estimated for purposes of this table.*